FAO/INFOFISH Technical Training Manual 1

THE NEED FOR FISH INSPECTION AND QUALITY ASSURANCE

by

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The need for education and training in fish inspection and quality assurance

Preface

Education and training are essential for efficient control at all stages of fish production from harvest through marketing and final consumption. Many countries lack or are short of adequately trained personnel who play a leading role in organising fish inspection and quality assurance activities including control of fish and shellfish-borne diseases.

The Food and Agriculture Organisation of the United Nations recognised this need for training at four levels:

- fishermen;
- fish processing plant workers;
- regulatory inspectors and fishery officers;
- supervisory personnel and quality control managers.

In many cases, training is best carried out on the job. However, it should not be assumed that this training alone will be sufficient for all types of personnel. For the specialised fish hygienist, fish technologist, fish inspector, supervisor, plant quality control manager, laboratory analyst, technicians and auxiliaries, it is recommended that training courses in technical institutions be developed. However, with few exceptions most developing countries lack facilities to train such personnel in their own institutions and are obliged to send them to industrialised countries.

The training of personnel at lower levels (plant operating personnel, fishermen, sorters and graders) is often neglected. It is equally important that these workers be introduced to the basic principles of fish handling, sanitation, quality control and the special technology of fish processing operations. Plant managers and government organisations should provide this level of training by means of prepared educational materials, in-service training and short courses.

Training will therefore have to vary with regard to curricula, time and study requirements of the different categories, and may change from short courses and on-the-job training to formal tertiary or post-graduate education.

An important output of the UNDP-FAO Programme on Global Training in Quality Assurance of Fishery Products (1988-1992) was the development of curricula to be used by developing countries when training personnel engaged in fish inspection and quality assurance.

This publication evolved as a result of the training project and is designed to be used by developing countries when training personnel from the public and private sector on the need for fish inspection and quality assurance.

About this training manual

Purpose of this manual

This manual is meant to be used for training fish inspectors and quality controllers. It is designed to introduce readers and train participants at a course or workshop on the NEED for a systematic approach to fish inspection and quality assurance.

Who will use this manual?

It is designed to be used by:

- experienced trainers who already have a basic background in fish/food technology and/or quality assurance.
- those who are not necessarily experienced trainers, but have the necessary background in the subject to teach the topic.
- the trainee or participant, who will be taught to use the ideas and objectives presented in this training manual.

The trainer's manual may be accompanied by a set of 40 slides available from INFOFISH, selected from illustrations already printed in this manual.

Subject matter and suggested presentation

An introduction to the need for fish inspection and quality assurance is created through a narrative text with illustrations available on slides. It is followed by a proposed discussion highlighting points raised in the slide presentation. A suggested exercise suitable for a group already introduced to the principles of the Hazard Analysis and Critical Control Point (HACCP)-concept is included. References for further reading are listed at the end of this manual.

The entire lecture should take approximately 2 hours. Through these sections, the manual will help you define clear aims and objectives of fish inspection and quality assurance.

The manual will target the following areas:

- the environment where fish is caught,
- harvesting and handling methods in different fisheries,
- processing, product types, marketing,
- how the above all relates to fish quality and the safety of fish as food,
- the need for fish inspection and quality assurance,
- the objectives and benefits of a programme of inspection and quality assurance of fishery products, and how to plan for an effective programme.

The slide presentation covers the entire journey from harvesting fish through utilisation and final consumption. This presentation aims to create an awareness amongst the audience on public health aspects of seafood consumption, both good and bad handling practices, and how these may affect the quality and safety of fish and fishery products. The presentation will emphasise how problems may be overcome with proper inspection, technology and surveillance in place based on the HACCP-concept.

The discussion which follows highlights the components of quality, quality assurance, HACCP, fish inspection and quality assurance programmes, how such programmes could benefit the fish processing

industry in a country and how to go about setting up such a system against several mentioned odds. You may plan and conduct the lecture accordingly.

This being the first lecture of an introductory training course on fish inspection and quality assurance, probably your participants would not have in all instances the necessary basic technical background and practical experience to perform in-depth exercises. The exercises devised here aim mainly to promote interest and active participation of the trainees in the subject matter, while evaluating his/her grasp of the subject matter. This evaluation will be necessary to set the level of training during the course.

Ask questions to create an awareness. Discuss answers openly, ask for opinions from participants and raise in their minds ideas on how they would hope to plan and achieve fish quality assurance through their jobs. Remember a participant brings to a training situation existing knowledge, skills and attitudes regarding his/her job, as well as ways of learning. Teaching and learning are also a two-way interchangeable process which go hand in hand.

It is well accepted that a variety of teaching methods may be necessary for effective learning. Learning something to the point of being able to do it, is most likely to be achieved by exercises involving the participant in actually doing something, be it THINKING, SPEAKING or a PRACTICAL exercise. This manual aims to do all of these, first by pictures which could provide up to an 80 percent sensorial learning process. The discussion and role playing exercise which follows should enhance a participant's thinking and speaking up.

Adapting the lecture to the participants

You may adapt the material to suit participants, finding the facilities, equipment and materials needed for the lecture. When you have an idea of who your participants are going to be you should be able to adapt this material to their needs. This means adapting to:

- their background and situation (use whatever information you can obtain about their training needs)
- the number of participants you can expect
- the time available to you for the entire course
- the facilities you are able to obtain (money, materials, equipment)

No trainer wants to just read out somebody else's course. You are no exception.

No group of trainees will be motivated by a trainer using material he did not adapt or prepare himself. The excitement of training will be missed.

The main reason you must adapt this material is that it was not designed for your particular group of trainees. Each group of trainees is special to a particular course.

First, read the entire manual, doing two things as you go through it:

- Study the principles of setting aims while preparing and planning. The participants must see the principles demonstrated in your teaching.
- Note where it is inappropriate to the environment and experience of your potential trainees. Which bits could fit well if you adapt them? Which are wrong for your needs? What do you need to add or leave out?

Secondly, clarify your aims.

Ask yourself what do the sort of trainees you have in mind need?

Are they all from the same place, or are you running a regional course for trainees from different countries?

You may need to perform the following adaptation steps:

- translate the manual into a totally different language
- change some of (or all!) the slides to new ones covering the specific problems of your trainees.
- develop and use transparencies to highlight the main points of this lecture.
- use a video film instead of the slide presentation and/or
- develop discussions/exercises specifically linked to your trainees.

You probably do not have the opportunity for a full assessment of their training needs - it would be marvelous if you did - so you now have to speculate a little at this stage about the aims. You can firm them up later, with fuller information about your trainees.

You should now go through the entire manual again making more detailed adaptation to the form your aims must take. Decide exactly what you will leave in and modify, what you will take out, and what you will add. Use this training manual as a guide to your lecture.

This is the first in a series of lectures developed to be taught over a two-week period at training courses on the organization and implementation of programmes for inspection and quality assurance of fish and fishery products. The entire course curriculum is presented at the end of this manual.

The need for fish inspection and quality assurance

Introduction

Short term needs

The main problem facing governments and the fish industry of the developing countries is to comply with foreign consumer expectations, particularly on quality. A lack of adequate infrastructure and technical expertise often translates into the mentioned quality defects. These, in turn, result in the loss of millions of dollars of foreign exchange earnings every year because of rejection and low prices for exports in key foreign markets.

The need to solve this problem has become urgent because new regulations in important markets will strongly influence the future possibilities of developing countries maintaining their positions as suppliers to these markets:

- New sanitary legislations being prepared by the European Economic Community (EEC) states that imported products from third countries (non-EEC members) will need to be produced under the same basic sanitary conditions as those established for European processors; furthermore, third countries inspection services will need to satisfy European standards of organization and efficiency.
- The possibility of introducing mandatory fish inspection in the USA will include a strict import inspection system. Accordingly, the certification of foreign seafood plants in exporting countries would be accepted by the USA where
    (a) the country has an acceptable inspection system
    (b) the foreign plants meet requirements equivalent to those for US plants.

The economic values at risk are enormous if we consider that exports from developing countries value more than US$15 billion and their net receipts in foreign exchange are more than US$10 billion. The matter is crucial for many developing countries. It is necessary to ensure that as many as possible will be able to cope and comply with the new conditions (requirements).

Fish is a nutritious and relatively safe protein food. However, the extensive utilisation of fish as food raises public health problems common with any other food industry, and with the same risk of products being contaminated with pathogenic organisms or toxins.

In addition, there are certain diseases commonly associated with fish, shellfish and the aquatic environment, such as bio-intoxications, *Vibrio parahaemolyticus* infection, parasitic diseases and botulism. Occasionally in the past (but fortunately not frequently), fish has been associated with outbreaks of foodborne diseases. Each time, the accompanying publicity has had a disastrous effect on the particular segment and probably a depressing effect on other fishery products. It is obvious that an effective inspection and quality assurance programme based on the HACCP concept must be in place to provide reasonable consumer protection.

Long-term approach

If developing countries are to secure and maintain markets abroad and protect and preserve the quality image of their exported fishery products, quality control is essential. However, quality control for export products alone aims, in its simplest terms, at ensuring that the requirements of foreign buyers are met. It must be recognised by planners and policy makers that to use fishery resources to increase national income alone will not help to solve the development/poverty/hunger problem. The approach needs to be multi-sectoral.

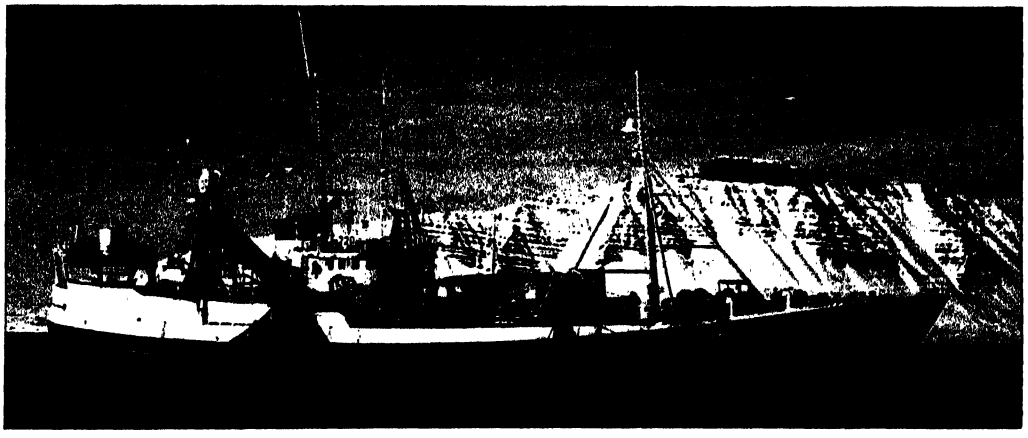
The establishment of a well organised and efficient national fish inspection and quality assurance programme could be of invaluable significance for the better utilisation of fishery resources of developing countries aimed at the maximisation of revenues, increasing foreign exchange earnings, generating employment opportunities, and providing valuable protein food. There is no doubt also that an improvement in fish inspection and quality control programmes would in the long run reduce post-harvest fishery losses.

The staff of a fish inspection service is in daily contact with almost all levels of the fish industry sector, namely fishermen, boat owners, workers, plant owners, plant supervisors, quality controllers, transporters, buyers, sellers, etc. Generally they are (or should be!) also in frequent contact with researchers from fish/food technology institutes and teachers of academic institutions. Consequently, they constitute a small albeit ideal army with the potential capability for the direct absorption and transfer of technical information to those involved with handling, processing, marketing, hygiene and quality assurance of fish and fishery products.

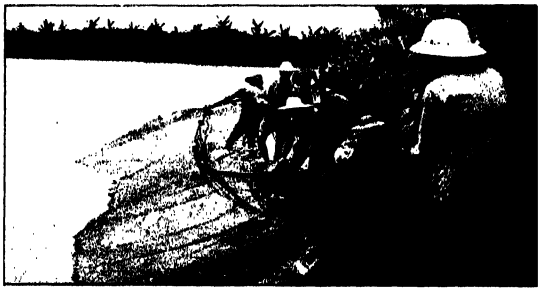
From a fishing trip to the diner's table

I invite you on a trip which starts from the moment fish is caught and taken off its environment up to the moment it reaches the consumer. The final eating quality of the fish will be the result of what has affected the product during each step of this trip.

1. Let us take a look at the importance of the environment where fish is caught. **What are we concerned with?** Potential public health hazards may exist in these waters which could affect fish quality. A fish may be caught in cold ocean waters. Its initial microbial flora will always reflect its environment. In this case it would have low counts with a predominance of psychrophilic or cold-loving bacteria. **Why are we concerned with microflora? What do bacteria do?** Microflora can carry hazards such as spoilage bacteria which as the name implies, spoils food. Potential pathogenic bacteria capable of causing disease and sickness in consumers may also be found.



2. Fish may be caught in freshwater lakes or rivers. Its microflora will be quite different from that of seawater fish. This might be one of the reasons why freshwater fish generally keep better in ice than seawater fish do.



3. Fish may be caught in coastal waters in the vicinity of normally inhabited and quite often industrialised areas. Human pathogens may be present in great numbers. Chemical pollutants such as heavy metals (mercury, cadmium) or pesticides (DDT) may also be present. These microorganisms and chemicals are known to contaminate fish and be a health hazard to consumers; the risk of contamination could depend on how polluted a fish-

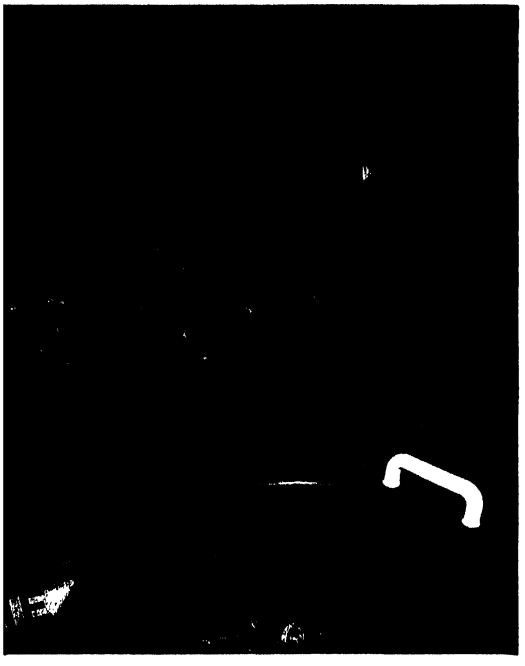
ing area is. If the fishing grounds happen to be in the warm coastal tropics, the microflora will show high total counts far more prolific than in cold waters.

4. Particular environmental problems are faced in certain areas affected by seasonal phenomenon called red tides. These blooms might be caused by toxic dinoflagelates that are ingested by shellfish bivalves (mussels, oyster, clams). When these shellfish are consumed by man PSP (Paralytic Shellfish Poisoning) may result.

5. Bivalve shellfish constitute a group of animals which deserve special attention. They filter the water of their habitat concentrating microflora and chemicals. Therefore, the concentration of pathogenic microorganisms, biotoxins and/or chemical toxicants in bivalve shellfish may constitute a serious health hazard to the consumer.

6. Pathogenic microorganisms may be transmitted by the consumption of fish and shellfish. Some of them, such as *Clostridium botulinum*, *Vibrio spp* including *V.cholerae*, *V.parahaemolyticus* and *Listeria spp* may occur in the natural environment where fish and shellfish are caught.

   Others such as *Escherichia coli*, *Staphylococcus aureus*, *Salmonella spp* and *Shigella spp*, contaminate fish and shellfish from human and animal sources. Viruses and parasites harmful to man may also be transmitted through fish and fishery products.



MOST COMMON BACTERIA OF HEALTH SIGNIFICANCE

ESCHERICHIA COLI

STAPHYLOCOCCUS AUREUS

SALMONELLA SPP.

SHIGELLA SP.

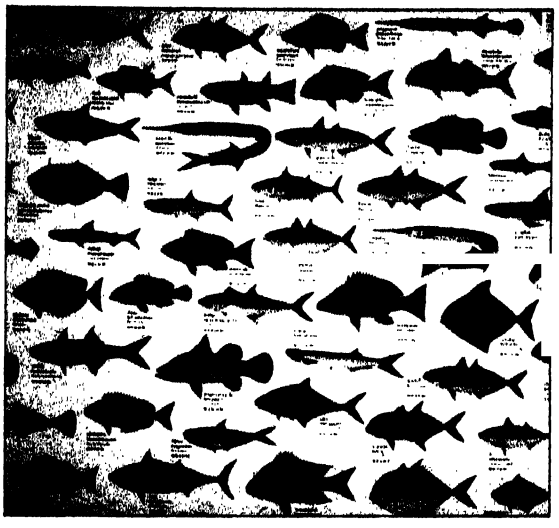
CLOSTRIDIUM BOTULINUM

CLOSTRIDIUM PERFRINGENS

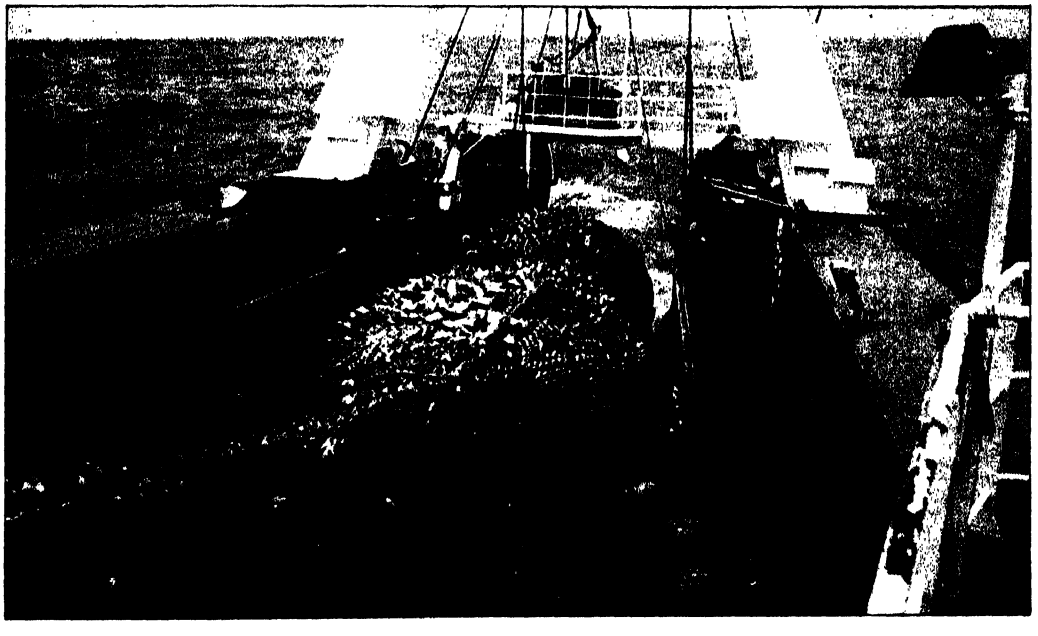
VIBRIO PARAHAEMOLYTICUS

VIBRIO CHOLERAE

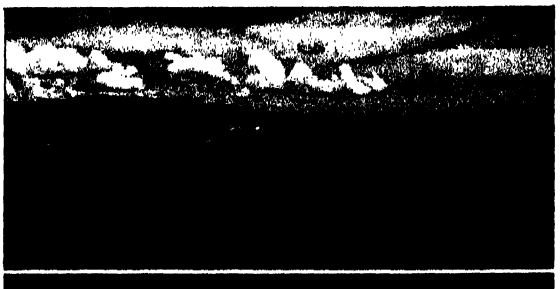
7. The fish industry, unlike the meat or dairy industry deals with literally hundreds of species, each with its own peculiar size, shape, physiology, ecology, chemical composition, catching and processing technologies.



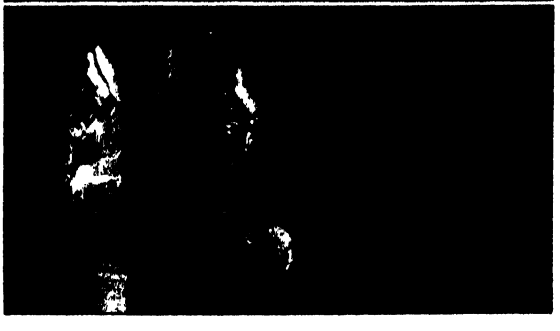
8. The catching method will contribute considerably to fish quality. For instance, fish caught by the trawler's net will suffer considerably more physical damage than that caught by hook and line. Notice the degree of squash.



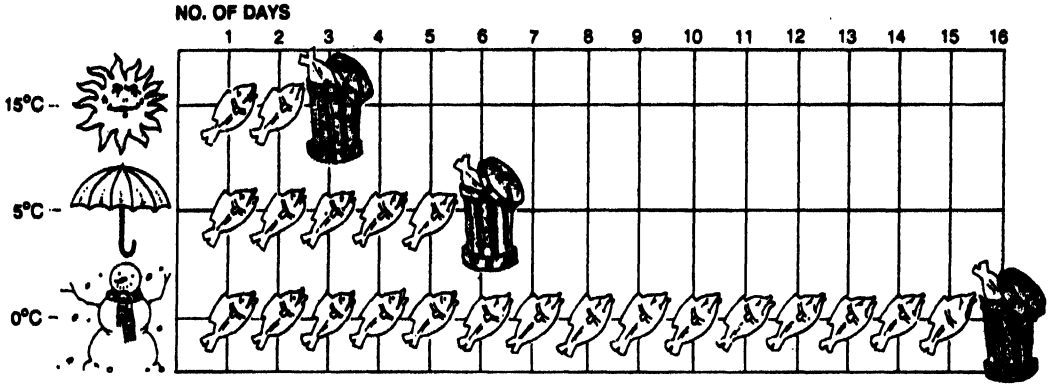
9. Aquaculture techniques on the other hand introduce the possibility of controlling under restricted conditions the fish environment, catching and handling techniques.



10. Problems associated with the rapid spoilage of fish are only too well known to fish technologists - how it occurs, why it occurs and the preventive action which should be taken. Spoilage occurs as a combined result of rise in temperature promoting microbial activity and enzymatic breakdown, and poor handling, likely



to cause physical damage and therefore enhance spoilage. Action needed to prevent spoilage and preserve quality will include all steps necessary to handle the fish with care and speed, and to keep the temperature of fish low. Herein lies the first challenge for a quality control programme.

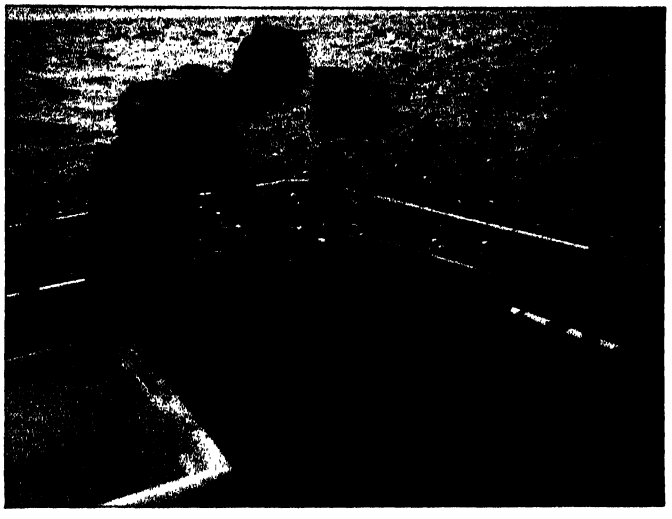


Shelf life of fresh fish at different temperatures (*Source: Billington, 1983*).

11. Fish handling, storage and transportation practices on board fishing vessels may considerably affect the quality of raw material. This sequence of slides aims to show the different conditions to which fish can be submitted in a range of situations worldwide. The first slide shows the case of a small boat, where no ice is taken on board. Ice, is necessary for chilling fish and keeping its temperature low so that spoilage is retarded.

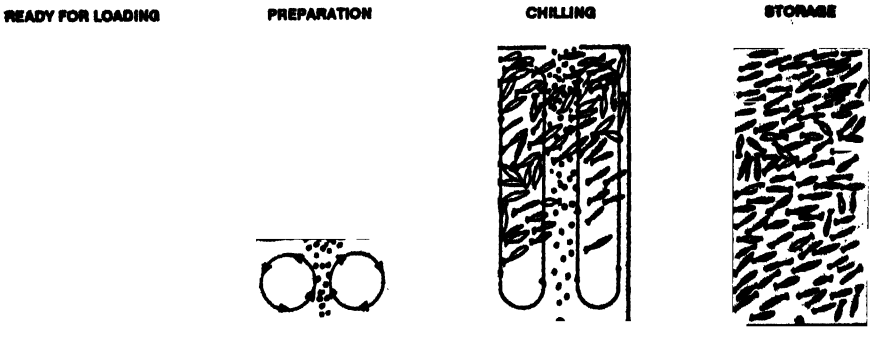
12. Small pelagic fisheries offer perhaps the most difficult practical challenge. These surface-dwellers are usually small and often delicate. Because of their schooling nature, they are generally caught in large numbers. Time and temperature, the key issues in fish preservation may be difficult to keep under control, thus greatly affecting fish quality. This is particularly the case with tropical fisheries.

13. Washing, gutting and sorting are operations which may be carried out on-board most fishing vessels catching demersal or bottom-living species. The conditions under which these operations are done and the time taken to carry them out may also affect fish quality.



14. Icing fish immediately after catch seems to be the more simple, cheaper and common chilling method used world-wide.

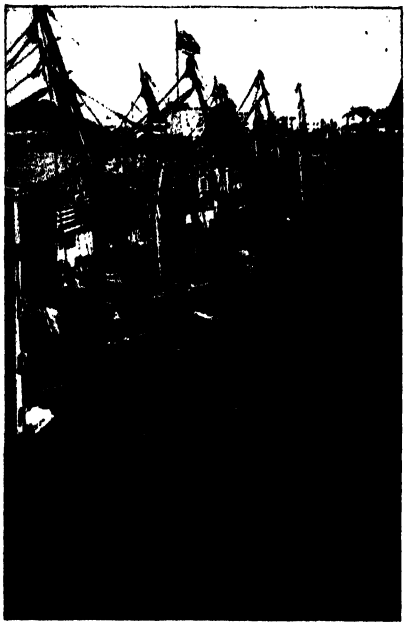
15. Refrigerated seawater (RSW) and chilled seawater (CSW) tanks and containers may be alternatively used for chilling fish on-board. CSW has special advantages in the case of small-scale fisheries. Both methods work quite well with small pelagics.



On left, a container charged with ice in a quantity corresponding to the expected fish and sea water temperature.
Sea water is added to the ice and the air agitation started before filling the container with fish.
Chilling of whole hake to 0°C under air agitation takes about 1 hour.
The air agitation is then stopped and the container closed for the chilled storage on board.

16. Fish quality may also be seriously affected by boat unloading operations. Landing must be done quick and without damage to the raw material. Suitable boat unloading as well as other landing facilities can considerably speed up fish landing operations. This is unfortunately not observed in many landing places.

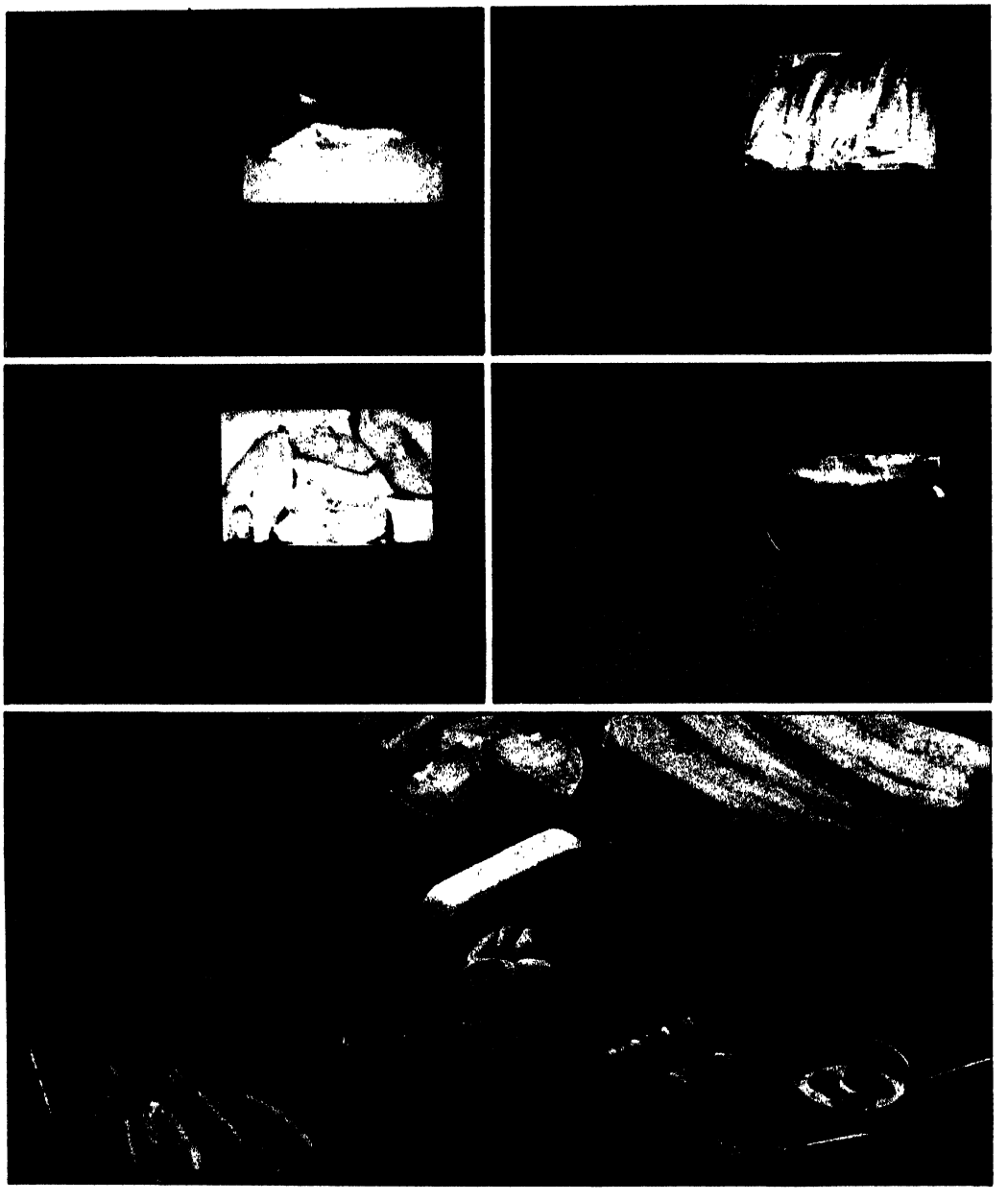
17. Simple methods such as slides, pulleys and bag nets may be used to facilitate unloading. Mechanised methods, such as pumps and conveyors are preferable in the case of larger boats.



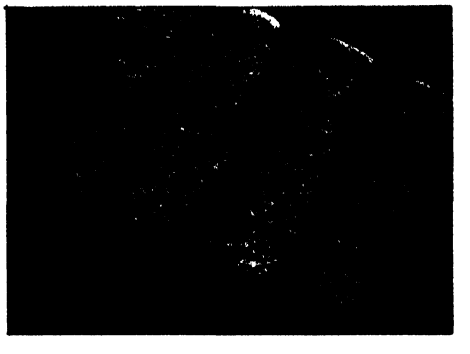
18. Once landed, fish may be sold at markets or further processed. At the market the quality of fish may deteriorate due to time/temperature abuse, physical damage or poor hygiene. Health hazards could also result from these negative factors which must be avoided or kept to a minimum. The following pictures show typical fish markets; a large auction, a supermarket and retail fish markets.

19. In transporting fish from the landing place to a market or processing plant, fish quality and sanitation may be affected by the same hazards: time/temperature abuse, physical damage and poor hygiene. Fish should always be transported properly chilled in clean containers and well protected from the heat and dust.

20. Fish may be presented to the consumer in many ways: whole, dressed (headed & gutted), in fillet-form or steaks.

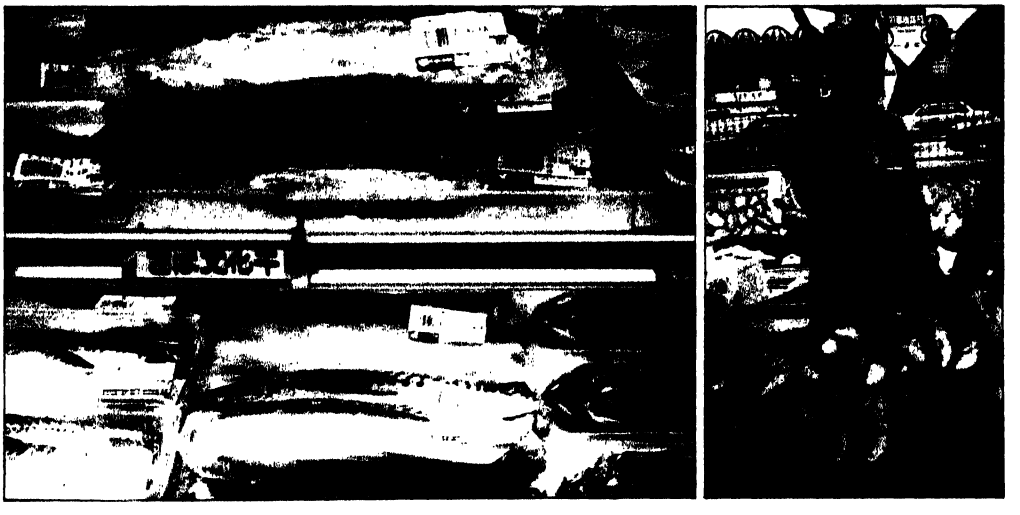


21. It could also be mixed with other ingredients to form fish fingers, breaded fish portions or fish sausages. This mixture, particularly when including other products of animal origin, could introduce a number of quality and health hazards to the preparation of fishery products.



22. Fish may be sold alive...

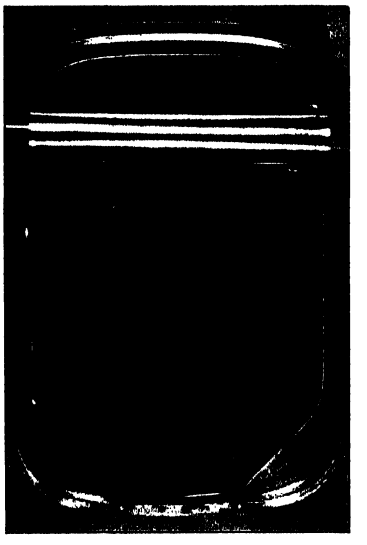
23. fresh and chilled,



24. frozen...

25. salted and dried...

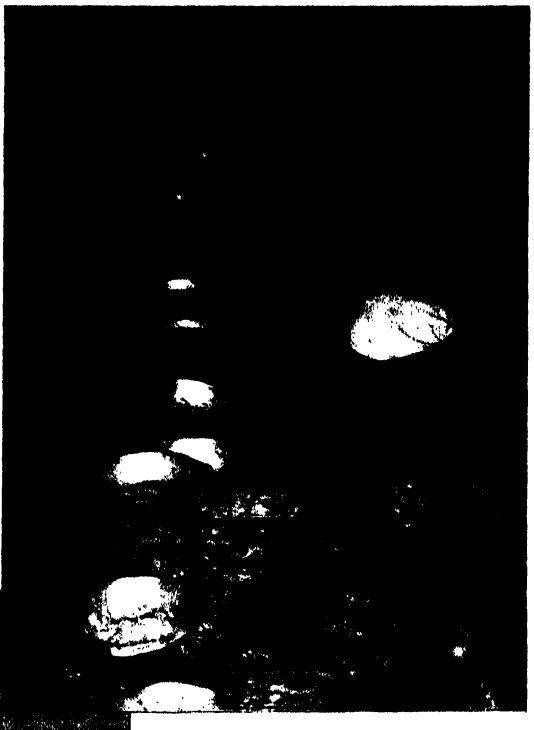
26. and canned.



27. The technical, hygienic and sanitary conditions where fish is handled and processed to achieve its commercial form will greatly affect its quality and wholesomeness. Fish may be processed on a sandy beach.

28. In certain places fish and shellfish may still be processed in a back street.....

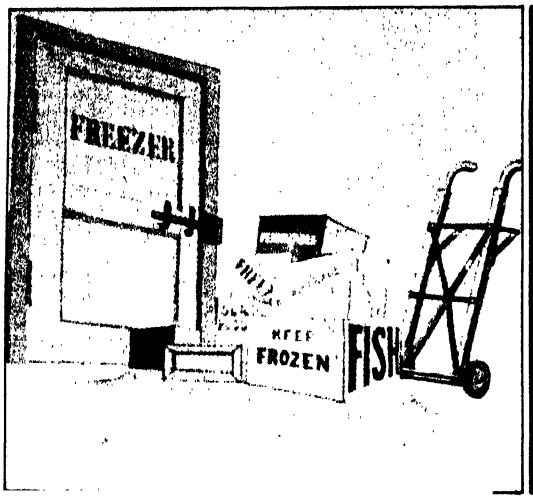
29. ...or in processing plants lacking minimal technical, hygienic and sanitary requirements for food processing.



30. It cannot be overstressed that fish is food for direct human consumption and should be treated as such. Therefore, fish handling and processing plants must have minimum technical, hygienic and sanitary conditions for food processing. The buildings should have an appropriate location and be constructed according to basic specifications and requirements for food processing.

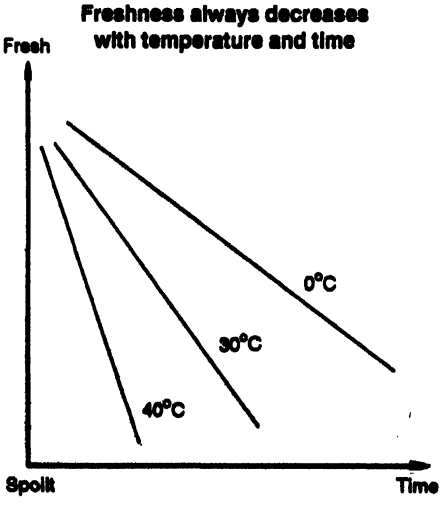
31. The facilities and equipment for fish handing and processing should be specially designed and constructed to meet this purpose. Particular care should be taken with operations such as washing, gutting, filleting, peeling, etc.

32. Quality may also be lost at storage places such as a cold storage room for frozen fish products.



33. The final stage of our trip is at the sale point where fish and fishery products face enormous competition from other products of animal and vegetable origin.

34. As mentioned at the onset of our fishing trip together, quality may be lost at each stage of the trip from catch to consumer. The final quality of fish and fishery products will be the result of the sum of factors that have affected them during each one of the stages. Once quality is lost nothing can be done to regain it. Most of the quality is lost while fresh fish is handled on board fishing vessels, landing and market places, transport vehicles and processing plants. Health hazards which may contaminate fish will invariably exist at various points of this trip, but measures can be taken to control these hazards.

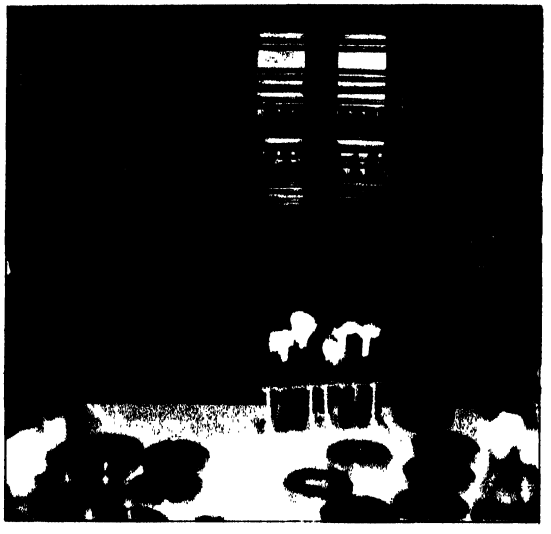


35. The consumer chooses the fish product she wants to buy from a large number of similar products. But how can she know if the product is safe and of good quality, particularly in the case of pre-packed foods?

36. It is at this point that the fish inspector must be brought into the picture. He or she is an individual with special training, knowledge and experience in all factors affecting the quality of raw and processed fish. He or she also has the authority to prevent the processing or sale of unacceptable fish and can either suggest or direct corrective measures. It is about the work of a fish inspector and that of quality control personnel at industry level that we are going to deal with. It is traditionally assumed that the work of the fish inspector/quality controller is restricted to the limits of a processing plant and/or an analytical laboratory.

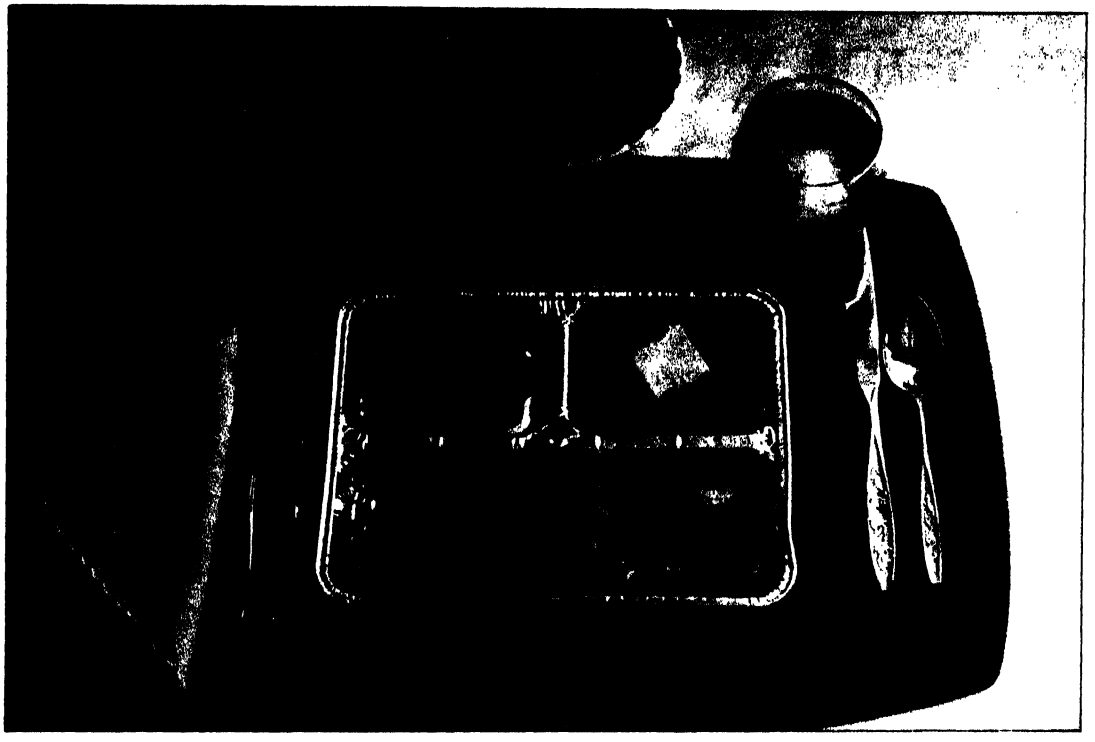
37. However, according to the modern concept of fish inspection and quality assurance, based on the principles of HACCP, the work of a fish inspector/quality controller should start from the moment fish is caught and cover all aspects of handling, processing and marketing operations. The attention of the fish inspector/quality controller should be concentrated in critical control points along this fish handling and processing chain. Therefore his/her presence at the fish reception area, checking fish quality through sensory analysis, is a must. His/her input would be necessary in planning, designing, implementation and supervision of quality management systems for fish processing plants.

38. The support and assistance derived from a specialised fish quality control laboratory will be necessary in the work of a fish inspector/quality controller.



39. At the producing end and government's side, the joint efforts of expert personnel in fish inspection and quality assurance should provide the consumer with a reasonable guarantee that the fish product she is buying is wholesome and of good quality.

40. A consumer will make a choice, buy the product, and include it in a meal for her family.



The work of the fish inspector and the quality controller is to assure that the consumer would be satisfied with the quality of fish as food and will come back again in the near future to buy fish once more.

What you have just seen is an example of what may happen with fish from the moment it is taken off from its natural environment until it is purchased by the consumer. Fish inspection and quality assurance will look into all phases of this journey imparting the necessary actions to ensure that a safe and good quality product reaches the consumer. Let us discuss this furthur. The aim of this discussion will be to reinforce the message you have just received, highlighting some of the points raised in it. Certain useful definitions and ideas for consideration have been included to assist with this discussion.

The need for fish inspection and quality assurance

Think about these

Quality

The composite of the various attributes and properties of the product that influence its acceptability to the buyer or consumer.

Fish quality

Takes into account the intrinsic quality or initial state of fish, the workmanship component of quality, and the microbial and biochemical component of quality.

Quality Assurance

All activities and functions concerned with the attainment of quality (British Standards Institution, 1979).

Quality assurance includes the functions of administration and management as well as technical operations such as inspection, testing and quality control.

Quality Control

Quality control or the war against spoilage and contamination, can be defined as all steps taken to inhibit or retard deteriorative changes of quality in fish by any procedure, method, technique and process available. These steps will be applied, from the moment fish is caught, through the handling, production, manufacture, storage and distribution phases and will include measures taken to prevent contamination and adulteration of the product.

What is HACCP?

HACCP is an abbreviation for Hazard Analysis of Critical Control Points. HACCP is a preventive strategy leading to control of all factors affecting the safety and quality of food.

The system is based on the awareness that safety and quality hazards will invariably exist at various points in a food chain from production through to consumption. However, measures can be taken to control such hazards.

What's fish inspection ? Fish inspection is the use of all methods and procedures available in effectively measuring the adequacy and value of quality control measures. They include official devices which are used to protect the consumer and facilitate trade.

The concept of fish inspection for the purpose of quality control, reducing post-harvest losses and better utilisation of fishery resources is relatively new in some developed countries. It remains mostly unknown or poorly understood in many developing countries. Frequently it is regarded in complete isolation from subjects such as technology of fishing and processing, technological research, development or expansion of industry and marketing. It is often wrongly equated with the elaboration of complex chemical and bacteriological standards, police enforcement of acts and regulations, government control of industry or interference with its growth.

Why inspect fish ?

Because basically every nation needs an effective food control service to promote a safe and honestly presented food supply and to protect consumers against foods which:

- are contaminated, decomposed or adulterated;
- may be injurious to health; or
- are deceptively packed or labelled with false or misleading statements.

Quality control - a major player

Quality control and its ramifications will play one of the most important roles in ensuring quality and reducing post-harvest fishery losses in the future. There is an increasing demand for expertise from developing countries for technical assistance to establish quality control and inspection programmes for fresh fish and seafood. At present this is directly related to the current demand for high quality fish for export. Many governments see this as means to obtaining foreign capital.

Importers' demands

Authorities of importing countries are obliged to protect the health of their citizens. They have established strict quality and hygiene regulations and legislations including well defined standards. Generally the same laws apply to imported and local products. Therefore **exporting** countries need to have an effective fish inspection system, acceptable and trusted by authorities in importing countries.

Equal standards for the home markets

Well-developed fish inspection and quality assurance programmes in developing countries are almost invariably oriented towards the quality assurance of fish products for export.Quality assurance for the domestic market receives only a very small proportion of the available resources in many of these countries.

A good possibility of finding spoilt fish

Fish in the process of spoiling and fish of low quality as a result of poor handling and preservation practices, are still frequently encountered in retail markets world-wide, particularly in less developed countries. Indeed, many consumers approach the purchase of fish with mixed

expectations because of the chances of receiving poor quality.

Even nowadays in some developing countries there is some measure of consumer tolerance of the situation. The situation is rapidly changing with increased consumer education, thus the need for closer fish inspection and quality assurance for both export and the local market.

Shortcomings

What are some of the existing drawbacks faced with introducing and implementing fish inspection ?

- Broadly, the lack of a national fishing industry policy providing overall guidance to the industry and establishing national strategies and regulations for resource management, harvesting, fish processing, marketing and human resource development.
- Loss of substantial product quality under existing harvesting, processing and distribution conditions.
- Underdeveloped and undercapitalised infrastructure serving the fishing industry eg. port landings, storage facilities and their distances from processing plants. Transportation and the negative impact poor conditions of roads and vehicles have on product quality.
- Fish markets being invariably situated in the most inaccessible parts of town, being old, without facilities for even ensuring basic standards of cleanliness and sanitation.
- Municipalities responsible for operating markets unfamiliar with procedures for handling and storing fish and with little interest to improve them.

At the factory ?

- Small-scale and labour intensive fish processing establishments lacking modern or even basic amenities.
- Producing sub-standard products with very short shelf life or very little appeal.
- Overlooking the need for proper hygiene and quality control measures.
- Very little effort being made to mechanise, improve efficiency and modernise operations.

Solutions

Combining technology with enforcement

A national scheme of technology transfer, strongly based on training programmes and extension services and where necessary by enforcement mechanisms is recommended. This can be achieved through a **National Fish Inspection and Quality Assurance Programme** organised and prepared to operate efficiently through technical assistance and education at all levels.

How could an inspection programme help?

The establishment of a national fish inspection and quality assurance programme in developing countries could be of invaluable significance for the better utilisation of fishery resources so as to

- maximise revenues
- increase foreign exchange earnings
- generate employment opportunities and
- provide valuable protein food

What are the objectives of inspection ?

- To ensure the safety of fish and fish products by putting into operation all the measures necessary to protect and safeguard the health of people who consume them.
- To reduce fish post-harvest losses.
- To ensure that fair trade practices are observed which prevent fraud and deception.
- To improve the environment in which fish is handled, processed, stored and distributed.
- To create confidence in consumers by providing and maintaining good quality in fish and fishery products.
- To guarantee a high reputation for fish as food and to promote the fish industry as a whole.
- To increase fish consumption.
- To contribute to a substantial improvement in national self-reliance and development of fisheries.
- To improve the earnings of fishermen and industry.
- To expand regional and national marketing opportunities and hard currency earnings through improvement and stabilisation of quality of fishery products.

- To minimise losses due to rejection or detention of exported products.

How to plan fish inspection ?

No model of an inspection system can be applied to all countries equally. What is good for one country may not suit another. However a system based on HACCP is one of the best available systems for food quality control. Such a system is now being introduced as a regulatory approach for the control of seafoods in several countries, both developed and developing.

Private sector involvement

Even when the government has been successful in establishing basic sector facilities and infrastructure, greater commitment and involvement from the private sector is needed. The fish trading community has to be convinced of the need to improve the marketing and distribution of fish products and join the drive to expand the market.

In conclusion

Therefore a very essential and what may seem like a formidable task is to draw up an effective and practical fishing industry policy to include all the components necessary for fish inspection. Use this policy as a basis to steadily improve conditions, laying down minimum standards of cleanliness, hygiene and acceptability of fish quality. While introducing these standards, gently give guidance in the desired direction Finally, **enforce** the use of improved practices for handling , processing and selling fish.

This forms the core of national fish inspection and quality assurance programmes. It has been achieved in many countries. Fish inspection and quality assurance programmes are now widely accepted and practiced as norm for the benefit of the people and the fish trade. You and I can do it for us all.

Suggested exercises

Divide participants in four groups. Give 10 minutes to each group to list the quality and safety hazards which may occur with a selected fishery product, at a particular step of the journey from its natural aquatic environment to the consumer.

For instance, in the case of frozen shrimp, the groups could cover :

- handling on-board or at the shrimp farm,
- unloading,
- plant processing, and
- distribution and marketing.

Choose some of the hazards identified by the participants and refer to the original groups, inquiring HOW those hazards might be controlled. Again, give them 10 minutes.

FURTHER READING

1. FAO (1992)
   Instructional techniques. Instructor's manual, 82p

2. FAO/DANIDA (1992)
   Proceedings of the International Conference on Quality Assurance of Fishery Products, Lyngby, Denmark, August 26-31, 1991 (in press)

3. FAO/INFOFISH (1987)
   Report of the FAO/INFOFISH Technical Consultation on Fish Inspection and Quality Assurance for Asia and Pacific, Cochin, India, February 16-19, 1987, INFOFISH Report No.14 INFOFISH, Kuala Lumpur, Malaysia, 1987, 109p

4. Garm, R. & Limpus, L. (1977)
   Organization of fish inspection programmes in developing countries, in:
   Proc. Conf. on the Handling, Processing and Marketing Tropical Fish, London, July 16-19, 1976, Tropical Products Institute(TPI), London, England, 1977, pp. 45-49

5. Huss, H.H. (1991)
   Use of HACCP in seafood production INFOFISH International 4/91 : 31-33

6. Lima dos Santos, C.A. (1991)
   Quality assurance: The need for national programmes INFOFISH International 1/91 : 55-59

Appendix I

Curriculum for formal classroom training

1. The need for fish inspection and quality assurance programmes (2 hours). *
2. Introduction to main fish harvesting methods (1 hour).
3. Notions of fish anatomy and physiology (1 hour).
4. Recognition of main commercially valuable species (2 hours).
5. Fresh fish quality and quality changes (2 to 4 hours).
6. Public health aspects of fish as food (2 to 4 hours).
7. Fish import sanitary regulations and their impact on developing countries (1 to 2 hours).
8. Basic fish handling and processing practices (2 to 4 hours). *
9. Plant sanitation and hygiene (1 to 2 hours). *
10. Development and application of the HACCP-concept (1 to 3 hours). *
11. Organisation of national fish inspection services (2 hours).
12. Organisation of plant quality control units (2 hours).
13. Quality Management (2 hours). *
14. Implementation of fish inspection at government level (2 hours).
15. Standards and codes of practices for fish and fishery products (1 hour).
16. Laboratory methods of quality control of fish and fishery products: basic principles and practical demonstration (3 hours).
17. International trade of fish and fishery products (1 hour).
18. Training of fish inspectors, quality controllers and plant personnel (2 hours).

Note: According to the specific needs of the trainees it would be advisable to cover in detail the production and quality assurance procedures for particular products and species, i.e., frozen, headless shrimp, canned tuna, etc. In this case the HACCP training module must be extended.

* a series of FAO-INFOFISH technical training manuals developed specifically for these lectures and available from INFOFISH.

Appendix II

List of illustrations

1. Icelandic fishing grounds. *Icelandic Freezing Plants Corp.*

2. Tropical fish pond. *FAO.*

3. Fishing for prawns, crabs and mullet in backwaters of Cochin, India. *FAO.*

4. Dinoflagellate bloom, New South Wales, Australia. Most red tides are harmless, but some carry toxic plankton. *B. McGrath (Courtesy: Australian Fisheries).*

5. Live clams in the USA.Producers have to tag clams to assure their harvest from approved beds. *Karen Straus. (Courtesy: Seafood Business).*

6. Most common bacteria of health significance.

7. Tropical marine fish species. *Dept.of Fisheries, Thailand.*

8. Cod-end of trawl. *Hampidjan (Courtesy: Export Council of Iceland).*

9. Shrimp ponds, Philippines. *San Miguel.*

10. (i) Progressive spoilage seen through dramatic, physical changes. *FAO.*

    (ii) Shelf life of fresh fish at different temperatures. *Billington, 1983. (Courtesy: New Zealand* Fishing Industry Board).

11. Artisanal fishing craft. *FAO.*

12. Pelagic fishery, South China Sea. *Darian Warne.*

13. (i) Sorting catch on-board in the North Sea. *Carlos Lima dos Santos, FAO.*
    (ii) Gutting catch on-board, DNG. *(Courtesy: Export Council of Iceland).*

14. Crushed ice is used to chill fish. *FAO.*

15. Preparing a chilled seawater (CSW) system for fish. *Poul Hansen, Technological Laboratory,* Ministry of Fisheries, Denmark.

16. (i) Poor handling of catfish, Rio Grande, Brazil. *Carlos Lima dos Santos, FAO.*
    (ii) A jetty well equipped with landing facilities, Newport, Oregon, USA. *Ichiro Kano, INFOFISH.*

17. (i) Bag-nets unloading fish, North Sea. *Carlos Lima dos Santos, FAO.*
    (ii) Slides facilitate unloading, Songkhla, Thailand. *Nirmala Richards-Rajadurai, INFOFISH.*

18. (i) Fish auction, Iceland. *(Courtesy: Export Council of Iceland).*
    (ii) Fresh fish market, Malaysia. *Gerard Roessink, INFOFISH.*
    (iii) Retailing fresh fish, India. *Nirmala Richards-Rajadurai, INFOFISH.*
    (iv) A fish section of a supermarket, Japan. *Ichiro Kano, INFOFISH.*

19. Icing fish at landing prior to insulated transport, Thailand. *Nirmala Richards-Rajadurai, INFOFISH.*

20. Various seafood products *Frionor*; Diagrams & insets. *FAO.*

21. Fish fingers.

22. Live fish market Sukabumi, Indonesia. *Tarlochan Singh, INFOFISH.*

23. (i) Chilled fish on supermarket shelf, Japan. *Ichiro Kano, INFOFISH.*
(ii) Fresh, chilled fish for sale, Malaysia. *Nirmala Richards-Rajadurai, INFOFISH.*

24. Horizontal plate freezer.

25. (i) Fish drying, Indonesia. *FAO.*
(ii) Dried fish for sale. *FAO.*

26. Canned fish.

27. Cleaning squid prior to drying, Malaysia. *L K Lim.*

28. Washing salted fish before redrying, Indonesia. *(Courtesy: TPI, London, UK).*

29. A peeling shed. *Nirmala Richards-Rajadurai, INFOFISH.*

30. A fish processing plant. *Delmar.*

31. Inside fish processing plants.

32. (i) Poor cold storage practice ruins products. *FAO.*
(ii) Frozen product with protective packaging entering cold store. *Mariscco, Singapore.*

33. A meat section in a supermarket. *FAO.*

34. Quality deterioration with time. *Nirmala Richards-Rajadurai, INFOFISH.*

35. Consumer choosing fish product. *FAO.*

36. The fish inspector. *FAO.*

37. (i) Fish inspector and plant quality control supervisor examining raw material on arrival at plant. *Carlos Lima dos Santos, FAO.*
(ii) Examining quality of gutted fish.

38. An analytical laboratory for microbiology, Export Inspection Agency, India. *Carlos Lima dos Santos,* FAO.

39. Inspection at production. *FAO and various.*

40. A meal including seafood. *FAO.*

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